

1

SELF ADJUSTING LOCKING PLIERS

This invention relates to a self adjusting mechanism incorporated into a pliers that enables the user to grip and lock the pliers using only one hand during the operation.

BACKGROUND OF INVENTION

Pliers are used in a variety of situations to grip a bolt, nut, wire, or other items. The general design uses the leverage of two elongated pieces having a handle portion at one end and a jaw piece at the other end. Both pieces are connected together at a pivot pin. When the handle portions are squeezed together, the jaws of the pliers grab the object desired. The length of the handle portions determines the amount of gripping power of the jaws.

Various locking mechanisms are on the market, such as the popular vise grips. These locking mechanisms use a series of hinges to lock the jaws of the pliers together. However, while a first hand grips the handles of the pliers, the other hand is used to turn a screw to adjust the locking mechanism. This means that the items to be gripped must be placed into the jaws snugly prior to the adjustment of the locking mechanism. Thus, such a mechanism requires the use of two hands in order to effectively grip and adjust the locking mechanism to lock an item with the vise grips.

SUMMARY OF INVENTION

An object this invention is to overcome the problem of using both hands to lock the pliers. This allows the user to perform other tasks with a free hand prior to and during the gripping and locking of the pliers. The invention overcomes this problem and others by providing pliers that allow for a single hand to hold and lock pliers. The locking mechanism comprises an arc shaped surface connected to one handle, and a hinged pressure contact on the other handle. The user uses a free finger on the hand gripping the pliers to pull a lever on the pressure contact to engage the pressure contact with the arc shaped surface. The contact transfers pressure to the jaws of the pliers to better hold an item in the jaws, while friction at the contact point keeps the handle with the pressure contact from moving with respect to the arc surface.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention will now be described in detail in association with drawings of which:

FIG. 1 is a perspective view of the pliers in an unlocked position.

FIG. 2 is a view in the direction of line 2—2 in FIG. 1.

FIG. 3 is perspective view of the pliers in a locked position.

FIG. 4 is a perspective view of a second embodiment of the invention in the unlocked position.

FIG. 5 is a view in the direction of line 5—5 in FIG. 4.

FIG. 6 is a cut away view showing the gearing of the pliers according to the second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the FIG. 1, pliers according to a first embodiment of the invention has a pair of elongated members 190 and 195 hinged connected together by a plier hinge pin 130. Jaw member 110 is the upper portion of elongated member 195 and jaw member 120 is the upper portion of elongated member 190. A work piece 100 may be inserted between the

2

jaw members. Elongated member 190 has a lower handle portion 150 and elongated member 195 has a lower handle portion 140. A user of the pliers grips the pliers at handle members 140 and 150 as shown by the ghost hand in FIG. 1.

Upon a squeezing of the handles together, the jaw members 110 and 120 are brought together by virtue of hinge pin 130, thus clamping down on work piece 100. The length of the pliers from hinge pin 130 to the place where the user grips the handle members determines the amount of clamping force between jaw members 110 and 120.

The locking mechanism works using an arc shaped surface 160 on the inside of a locking bar 155, which is connected to a bottom portion of handle member 150. Arc shaped surface 160 follows along an imaginary circle having a center at plier hinge pin 130. On the other handle member 140, a hinged lever 170 is connected at a bottom end via a hinge pin 135. A finger lever 175 allows the user to rotate hinged lever 170 with the use of fingers on the hand which hold the pliers. A pressure contact 180 interconnected to hinged lever 170 via a set screw 185 extends away from hinge pin 135. Set screw 185 is used to adjust how far away from hinged lever 170 pressure contact 180 will extend. As shown in FIG. 2, pressure contact 180 has a point 185 that travels along the middle width of arc shaped surface 160.

Ideally, the combination of distances between the center of plier hinge pin 130 to hinge pin 135 and between hinge pin 135 to the tip of pressure contact 185 will be greater than the distance between the center of plier hinge pin 130 and arc shaped surface 160. Upon rotation of the hinged lever 170 via use of the fingers as shown in FIG. 3, the pressure contact 180 contacts arc shaped surface 160. By friction at this contact point, pressure contact 180 does not move with respect to arc shaped surface 160. Upon continual rotation of hinged lever 170 to a position where finger lever 175 is parallel with handle member 140 and pressure contact 180 extends along a line parallel to the handle member 140, handle member 140 is brought closer together to opposing handle member 150, which provides an increased clamping force between the jaw members 110 and 120. Note how handle members 140 and 150 are closer as shown by angle β together in FIG. 3 compared with angle α from FIG. 1 upon the locking of the pliers via the rotation of finger lever 175. As long as the user continually squeezes the handle members 140 and 150 and simultaneously holds finger lever 175 parallel to the handle member 140, jaw members 110 and 120 are locked in a clamping position, securing work piece 100. Further, the rotation of the hinged lever 170 provides a mechanism for applying more torque between the jaw members 110 and 120 than the user could by only squeezing the handle members 140 and 150 together.

In FIGS. 4—6, another embodiment according to the invention is shown. Rather than the jaw members being in a direction relatively parallel the elongated members as was shown in the first embodiment, this embodiment uses a pair of jaw members 545 and 555 which are relatively perpendicular to elongated members 540 and 550 (Shown in FIG. 4).

The pliers comprises an upper jaw member 555 and a lower jaw member 545. The upper jaw member is integrally connected to elongated member 550. As shown in FIG. 6, the lower jaw member 545 is hinge connected to elongated member 550 via a jaw pin 630, which allows lower jaw member 545 to rotate about jaw pin 630 to clamp onto items place between upper and lower jaw members 555 and 545. Lower jaw member 545 has jaw gears 620 which are operably connected to elongated member 540 via gears 600. The interaction of jaw gears 620 and gears 600 provide that